

PROGRAM CHARTER**FOR****Climate Observation and Analysis**

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1. EXECUTIVE SUMMARY**Program Description**

The goal of the Climate Observations and Analysis (COA) Program is to describe and understand the state of the climate system through integrated observations, data management, and analysis. The COA Program directly supports the other four Climate Programs under the National Oceanic and Atmospheric Administration's (NOAA) Mission Goal: Climate. COA also contributes to the other four NOAA Mission Goals: Ecosystems, Weather and Water, Commerce and Transportation, and Mission Support.

The COA Program is organized under three capabilities: *Observations* (atmosphere & oceans, including Arctic), *Data Management*, and *Analysis of the Climate System*. These capabilities taken together increase the value and utility of observations, improve the performance of models, and reduce the uncertainty of predictions. *Observations* are the foundation for research critical to understanding the Earth's climate system, improving climate predictions, and monitoring current climate variations and placing them into historical perspective. *Data Management* consists of two major activities conducted in coordination: data management services and data stewardship. They constitute a comprehensive end-to-end process including movement of data and information from the observing system sensors to the data user. This process includes the acquisition, quality control, metadata cataloging, validation, reprocessing, storage, retrieval, dissemination (access and retrieval), and archiving of data. Data Stewardship is the application of rigorous analyses and oversight to ensure that data sets meet the needs of research, business and industry, and government users. *Analysis of the Climate System* addresses ongoing current analyses and climate model reanalyses that lead to timely and improved assessments of present and past climate variations and change. The resulting improved understanding of the climate system is critical for reliable and meaningful economic and environmental forecasts. Rapid access to new and historical quality data records supports the analysis capability. The above COA activities are essential to supporting the development of policies and plans that will impact the Nation's economy, environment, and society, present and future.

A major objective of the COA Program is to provide NOAA with the capabilities and capacities to contribute to the national and global objectives outlined in the Strategic Plan for the Climate Change Science Program (CCSP), the U.S. Integrated Earth Observation System (IEOS) Strategic Plan and the Global Earth Observation System of Systems (GEOSS) 10-Year Implementation Plan. These contributions are built on NOAA's ongoing expertise and capabilities in observing systems, data management, climate analysis, applied research, and predictions of future climate variability and the associated impacts to society, such as the El Nino phenomenon.

At any one time there are over 25 different ongoing projects funded under the COA Program in laboratories and offices at many geographical locations across the U.S. and its territories. Refer to <http://www.climate.noaa.gov> for information about the NOAA Climate Goal. NOAA's national and global observations can be explored at <http://nosa.noaa.gov>. Refer to the appendix for a listing of additional URL links that support associated projects and activities.

2. PROGRAM REQUIREMENTS

A. Requirement Drivers:

Legislation:

- *National Weather Service Organic Act, 15 U.S.C. § 313*: This act ensures there are atmospheric, oceanic, and terrestrial measurements suitable for establishing and recording U.S. Climate Conditions.
- *Federal Records Act as amended, 44 U.S.C. §3101 et seq.*: This act is responsible for the establishment of the National Weather Records Center which archives and services U.S. weather and climate records.
- *National Climate Program Act, 15 U.S.C. 2901-2908, at 2904(d) (4), et seq.*: This act requires that one program element will be the provision of "useful and readily available information on a continuing basis." It authorizes global data collection, and monitoring and analysis activities to provide reliable, useful and readily available information on a continuing basis. In addition, the act authorizes measures for increasing international cooperation in climate research, monitoring, analysis and data dissemination.
- *Global Change Research Act of 1990, 15 U.S.C. 2921 et seq.*: This act ensures the establishment of global measurements and worldwide observations, and requires an early and continuing commitment to the establishment and maintenance of worldwide observations and related data and information systems.
- *Consolidated Appropriations Act, 2005, Public Law No. 108-447, 118 Stat. 2908 (Dec. 8, 2004)* incorporates S. 1218, the Oceans and Human Health Act: "establish a Federal research program that examines ocean resources and their applications to human health."; "...ensure that any integrated ocean and coastal observing system provides information necessary to monitor, predict and reduce marine public health problems including:(A) baseline observations of physical ocean properties to monitor climate variation; (B) measurement of oceanic and atmospheric variables to improve prediction of severe weather events; ..."
- *Coastal Zone Management Act (CZMA) of 1972, 16 U.S.C. 1450 et seq. (amended 1990 and 1996)*: Requires understanding and predicting long-term climate change which may have large impacts in the coastal zone such as global warming and associated sea level rise.
- *36 C.F.R., Chapter XII National Archive and Records Administration (NARA) Records and Guidelines*: This stipulates that data maintained for legal purposes and in the national interests must be archived using NARA standards.
- *Data Quality Act, Public Law 106-554, Section 515, 2001*: This act requires that the U.S. government must assure the quality of the information disseminated.

U. S. Executive Branch and NOAA Directives and Other Guidelines:

- *Strategic Plan for the Climate Change Science Program, July 2003*: This plan articulates a number of climate observation objectives, with the overarching goals of completing the required atmosphere and ocean observation elements in a manner consistent with Climate Monitoring Principles. This is needed to improve and understand of the causes of observed variability and change.
- *Strategic Plan for the U. S. Integrated Earth Observations System (USGEO Report, 2005)*: This plan addresses the policy-related, technical, and fiscal components of a U.S. integrated Earth observation system.
- *President's Security and Prosperity Program of North America Initiative (SPP)*: SPP is a trilateral agreement among the U.S., Canada, and Mexico signed in March 2005. One of the many facets of the agreement relevant to the Climate Program involves "enhancing the joint stewardship of our environment... through cooperation and information sharing"
- *Global Earth Observation System of Systems (GEOSS) 10-year Implementation Plan*: This plan summarizes the essential steps to be undertaken over the next decade by nations, and intergovernmental, international, and regional organizations, to establish a coordinated and comprehensive sustained Earth observations system.
- *U.S. Ocean Action Plan*: Administration's response to the U.S. Commission on Ocean Policy Report: To accomplish actions within the plan requires the access to and use of archived (new and historical) quality observations of essential climate ocean variables.
- *Department Administrative Order (DAO) 212-2 Information Technology Handbook*: This handbook defines data management and related activities as: identifying the information needed; defining and documenting data requirements; coding and structuring the data; designing the database; selecting and using the most effective storage technology; collecting the data; processing the data; disseminating the information and facilitating user access; protecting the data against damage and unauthorized access; and archiving and disposing of the data.

Interagency and International Agreements:

- *International Council of Scientific Unions (ICSU) guidelines/policy regarding World Data Centers (WDC) – National Climatic Data Center WDC for Meteorology and Paleoclimatology*: This agreement requires archiving and access to data collected by internationally sponsored observation and research programs. It allows for the active exchange of climate data with foreign countries to support research and other activities.

B. Mission Requirements:

- Establish an Agency Records Center for U.S. Weather and Climate records. (*Federal Records Act*)
- Provide long-term preservation of the Nation's Climate Record. (*Federal Records Act, Data Quality Act, National Climate Program Act, NARA Records and Guidelines, ICSU World Data Center Guidelines & Policy, and U.S. Ocean Action Plan*)

- Provide climate data and information that meets rigorous scientific standards for quality. (*Data Quality Act, Coastal Zone Management Act, and U.S. Ocean Action Plan*)
- Provide access to Climate Data and Information (timely, easy, and convenient) related to the state and changing state of the climate system in a variety of formats to NOAA's customers. (*Federal Records Act, National Climate Program Act, NARA Records and Guidelines, ICSU World Data Center Guidelines & Policy, Consolidated Appropriations Act, and U.S. Ocean Action Plan*)
- Provide monitoring, assessment, and analysis of the climate system through adequate quality observations and measurements of atmospheric, ocean, and select terrestrial "essential" variables. (*Global Change Research Act, National Climate Program Act, National Weather Service Organic Act, Coastal Zone Management Act, and U.S. Ocean Action Plan*)

3. LINKS TO THE NOAA STRATEGIC PLAN

A. Goal Outcomes: The COA program identifies with the following Climate Goal Outcome to develop, improve, and maintain "A predictive understanding of the global climate system on time scales of weeks to decades with quantified uncertainties sufficient for making informed and reasoned decisions."

B. Goal Performance Objectives: The COA program identifies with the following Climate Goal Performance Objective: "Describe and understand the state of the climate system through integrated observations, analysis, and data management."

C. Goal Strategies: To achieve its objectives, the COA program relies on following strategies:

1. Improve the quality and quantity of climate observations, analyses, interpretation, and archiving by maintaining a consistent climate record and by improving our ability to determine why changes are taking place.
2. Advance sub-seasonal to inter-annual climate predictions and climate change projections by improving analysis of the climate system.
3. Develop and contribute to routine state-of-the-science assessments of the climate system for informed decision-making.
4. Work with customers in order to deliver climate services and information products involved in health, safety, environmental, economic, and community planning that increase the effective application of this information.
5. Coordinate among NOAA Line Offices the transition from investigator driven research projects to operational facilities, capabilities, and products.
6. Support educational efforts to create a more climate-literate public by developing climate educational materials, involving teachers in the research process, and generating tools to allow climate information to be used in decision-making.

4. PROGRAM OUTCOMES

- Enable policy makers and resource managers to make informed national and global policy

decisions using integrated climate observations and analysis.

- Easy and convenient access by NOAA and its customers to new and historical national and global observations and climate analyses that meet rigorous scientific standards for quality.
- Comprehensive documentation of the state of the climate system through a network of integrated climate observing systems.

5. PROGRAM ROLES AND RESPONSIBILITIES

This program is established and managed with the procedures established in the NOAA Business Operations Manual (BOM). Responsibilities of the Program Manager are described in the BOM. Responsibilities of other major participants are summarized below:

A. Participating Line Office, Staff Office, and Council Responsibilities:

1. NOAA Office of Oceanic and Atmospheric (OAR) is responsible for conducting climate observation research through its offices, laboratories and cooperative institutes, including but not limited to: the Climate Program Office, Pacific Marine Environmental Laboratory; Earth System Research Laboratory; and the Atlantic Oceanography and Meteorological Laboratory.
2. The National Environmental Satellite Data and Information Service (NESDIS) is responsible for the National Climatic Data Center (NCDC), and the Office of Research and Applications, which conducts research on the use of satellite data.
3. The National Weather Service (NWS) operates several key observation systems and is responsible for the Office of Climate, Water and Weather Services, as well as the National Centers for Environmental Prediction (NCEP). NCEP's Climate Prediction Center is responsible for various analysis projects within COA. NWS's regional climate services, such as the Western Region Forecast Office, contribute to regional decision support activities.
4. The NOAA Observing Systems Council (NOSC) provides strategic direction for the NOAA Observing System Architecture project and Data Management.
5. The Ocean Council provides guidance and recommendations regarding national ocean issues and other ocean related activities including global ocean observations.
6. The Office of General Counsel provides legal services necessary to enable the program to discharge its duties.

B. External Agency/Organization Responsibilities:

- The State Climatologists operate state observing systems that fill in monitoring gaps, perform quality control and provide access to data, and conduct assessments and analysis in support of climate variation and decision making at the state and regional levels. They are also involved in education and outreach at the state and local levels.
- The Regional Associations (Public and Private), such as the Western Governors Association, provides a focal point for drought conditions and other water management issues.
- Other Federal Agencies, such as U.S Geological Service, U.S. Forest Service, U.S. Department

of Agriculture, Department of Transportation, and others operate a wide range of observing systems, particularly atmospheric and terrestrial. These data are shared and the observing stations provide an opportunity to collocate and co-use platforms, communications, etc.

International Partners include:

- International Council for Science (ICSU) - provides a forum for the discussion of policy issues for the benefit of the international scientific community. The World Data Centers (WDC) operates under the auspices of ICSU and follows the basic principles and responsibilities of the international exchange of data to support science and research. WDC facilitates the exchange and access to data collected across the globe.
- World Meteorological Organization (WMO) - provides a forum for establishing standards and cooperative activities such as GEOSS. It provides the framework for weather and climate observing networks, such as data exchange, measuring methods and techniques, common telecommunication procedures, and access to data and processed information.
- Global Climate Observing System (GCOS) – Co-sponsored by WMO, IOC, UNEP, and ICSU. User-driven operational system capable of providing the comprehensive observations required for monitoring the climate system, for detecting and attributing climate change, for assessing the impacts of climate variability and change. It addresses the total climate system including physical, chemical and biological properties, and atmospheric, oceanic, hydrologic, cryospheric, and terrestrial processes. It stimulates, encourages, coordinates and otherwise facilitates the taking of the needed observations by national or international organizations. It provides an operational framework for integrating, and enhancing as needed, observational systems of participating countries and organizations into a comprehensive system focused on the requirements for climate issues. GCOS builds upon, and works in partnership with, other existing and developing observing systems such as the Global Ocean Observing System (GOOS), the Global Terrestrial Observing System (GTOS), and the Global Observing System (GOS) and Global Atmospheric Watch (GAW) of the World Meteorological Organization.
- World Climate Research Programme (WCRP) - Joint sponsorship of ICSU, WMO and IOC. Programme objectives are to develop the fundamental scientific understanding of the physical climate system and climate processes needed to determine to what extent climate can be predicted and the extent of human influence on climate.
- Joint Commission on Oceanography and Marine Meteorology (JCOMM) – WMO/IOC intergovernmental body of experts, provides the international, intergovernmental coordination, regulation and management mechanism for an operational oceanographic and marine meteorological observing, data management and services system.
- North American Drought Monitoring – a multilateral agreement to monitor and evaluate drought conditions across Canada, Mexico, and the U. S.

6. END USERS OR BENEFICIARIES OF THE PROGRAM:

The output of the COA Program can be translated into sustainable National economic business plans and activities accounting for billions of dollars each year. Virtually every sector of the Nation's economy benefits from the data and analyses produced by this program. COA contributes to

environmental stewardship, management of natural resources, and the preservation and restoration of ecosystems. NOAA data users can be placed into several general categories: 77 percent Business; 13 percent Public; 6 percent Government; and 4 percent Academic. In a typical month, over 180,000 national and international contacts for NOAA data are made via the Internet, up to 5,000 orders are completed, and up to a terabyte of data are digitally delivered to the customer, often during the ordering transaction. A brief analysis of each user group follows:

1. Business – The program provides data and analyses beneficial to businesses developing and modifying business plans (40 percent U.S. Gross National Product) sensitive to climate and weather.
2. Public – The program contributes to improved understanding of climate variability and change, including extreme events (e.g. droughts, El Nino rains, coastal erosion), enabling the public to plan, anticipate, mitigate, and adjust appropriately.
3. Government – The program supports decision-makers with policy formulation to mitigate climate impacts and reduce costs. It provides information needed to manage natural resources and ecosystems, enhance studies on the spread of climate sensitive diseases, and contribute to mitigating natural hazards along the coast and the interior of the Nation.
4. Academia – The program awards funding for extramural research and observations to support these research programs. Academia provides access to NOAA data and information for education levels from primary and secondary schools (K-12) to undergraduate and graduate levels.

APPENDIX

Links to Associated Projects and Programs:

Climate Goal <http://www.climate.noaa.gov>
NOAA Observing System Council (NOSC) <http://www.nosc.noaa.gov>
NOAA Observing System Architect (NOSA) <http://www.nosa.noaa.gov>
Office of Climate Observations (OCO) <http://www.oco.noaa.gov>
Group on Earth Observations (GEO) <http://earthobservations.org>.
U.S. Climate Change Science Program (CCSP) <http://www.climatescience.gov>
CCSP Strategic Plan: <http://www.climatescience.gov/Library/stratplan2003/default.htm>
Climate Change Research Initiative (CCRI) <http://www.climatescience.gov/about/ccri.htm>
NOAA Office of Global (OGP) Programs <http://www.ogp.noaa.gov>
Global Climate Observing System (GCOS) <http://www.wmo.ch/web/gcos/gcoshome.html>
Global Atmospheric Watch (GAW) http://www.wmo.ch/web/arep/gaw/gaw_home.html
Climate Reference Network (CRN) <http://www.ncdc.noaa.gov/oa/climate/uscrn/>
Global Ocean Observing System (GOOS) <http://ioc.unesco.org/goos/>
International Polar Year (IPY) <http://www.ipy.org/>
NOAA Arctic Research Program <http://www.arctic.noaa.gov>
NOAA Climate Monitoring and Diagnostics Laboratory (CMDL) <http://www.cmdl.noaa.gov/>
Baseline Surface Radiation Network (BSRN) <http://www.cmdl.noaa.gov/star/bsrn.html>
Global Baseline Surface Radiation Network <http://www.gewex.org/bsrn.html>
U. S. Surface Radiation Network (SURFRAD) <http://www.srrb.noaa.gov/surfrad/index.html>
Quality Assurance Center for the Americas (GAW) <http://marble.asrc.cestm.albany.edu/qasac/>
Central UV Calibration Facility <http://www.srrb.noaa.gov/calfacil/calpage.htm>
National Climatic Data Center (NCDC) <http://www.ncdc.noaa.gov>
National Oceanographic Data Center (NODC) <http://www.nodc.noaa.gov>
Global Observing Systems Information Center (GOSIC) <http://gosic.org>
NOAA Climate Diagnostics Center (CDC) <http://www.cdc.noaa.gov/>
NOAA Air Resources Laboratory (ARL) <http://www.arl.noaa.gov/>
NOAA Forecast Systems Laboratory (FSL) <http://www.fsl.noaa.gov/>
NOAA Cooperative Observer Program (COOP) <http://www.nws.noaa.gov/om/coop/>
World Meteorological Organization (WMO) Programme <http://www.wmo.ch/index-en.html>
International Council for Science (ICSU) http://www.icsu.org/5_abouticsu/INTRO.html
International Council for Science - World Data Center (WDC) System
<http://www.ngdc.noaa.gov/wdc/appendix/gdappenb1.html>